

### **REMARKS/ARGUMENTS**

As an initial matter, a Supplemental Information Disclosure Statement is submitted with this amendment, including copies of all foreign patent and literature references not included with Applicant's Information Disclosure Statement of July 14, 2004. It is respectfully requested that the Examiner consider these references and include confirmation thereof in the next Patent Office communication.

Claims 3-11 have been examined and rejected. Claims 3, 4, 7, and 9-11 have been amended. Claims 1, 2, 6, and 12-15 have been canceled. New dependent claims 16-22 have been added. Support for these new claims can be found throughout the originally filed disclosure, for example with reference to paragraphs 15, 37, 82, and 85. As such, no new matter has been added thereby. Re-examination and reconsideration of the pending claims, 3-5, 7-11, and 16-22, are respectfully requested.

#### **Restriction Requirement**

Applicants have canceled claims 1, 2, and 12-15 without prejudice pursuant to a restriction requirement. Applicants reserve the right to pursue patent protection for these inventions in a subsequently filed divisional application.

#### **Specification Amendment**

Applicants have amended the specification so that it now reflects the four issued patents, as requested by the Examiner.

#### **Rejections under 35 U.S.C. § 112**

Claims 3-11 have been rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter. Claims 3, 4, 7, 9, and 10 have been amended, as requested by the Examiner, so that the amended language now clearly claims the subject matter. As such, Applicants request the withdrawal of all 35 U.S.C. § 112 rejections.

Double Patenting Rejections

Claims 3-11 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-23 of commonly owned U.S. Patent No. 5,858,477. Claims 3-6 have also been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-23 of commonly owned U.S. Patent No. 5,858,477 in view of U.S. Patent No. 5,374,318 issued to Rabalais et al. Applicants will file a terminal disclaimer with respect to the '477 patent to obviate these non-statutory double patenting rejections once this case is otherwise in condition for allowance.

Claims 3 and 6 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-2, 13, 24-25, and 29 of U.S. Patent No. 6,827,977 or claim 22 of U.S. Patent No. 6,663,753. Claims 3 and 6 have also been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claim 22 of U.S. Patent No. 6,663,753 in view of Rabalais et al. Claims 3 and 5-6 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1, 4-6, 8, 13, and 17 of U.S. Patent No. 6,764,579. Claims 3 and 5 have been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1, 5, 7, 10, and 15 of U.S. Patent No. 6,416,816. Further, claims 3 and 5 have also been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1, 5, 7, 10, and 15 of U.S. Patent No. 6,416,816 in view of Rabalais et al. Claim 4 has been rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-2, 13, 24-25, and 29 of U.S. Patent No. 6,827,977 or claim 22 of U.S. Patent No. 6,663,753 or claims 1, 4-6, 8, 13, and 17 of U.S. Patent No. 6,764,579 or claims 1, 5, 7, 10, and 15 of U.S. Patent No. 6,416,816 respectively in view of Rabalais et al. or U.S. Patent No. 5,616,179 issued to Baldwin et al. Finally, claims 3 and 6 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1, 8, 17, 18, 24-26, and 28-30 of U.S. Patent Application No. 10/359,298. Claims 3 and 6 have also been provisionally rejected under

the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1,8, 17, 18, 24-26, and 28-30 of U.S. Patent Application No. 10/359,298 in view of Rabalais et al.

Such rejections are moot as U.S. Patent Nos. 6,827,977; 6,663,753; 6,764,579; 6,416,816 and U.S. Patent Application No. 10/359,298 are not citable as prior art against the present application. In particular, the '977 patent has an effective filing date of March 7, 2000, the '753 patent has an effective filing date of June 20, 2002, the '579 patent has an effective filing date of September 13, 2002, the '816 patent has an effective filing date of June 11, 2001, and the '298 application has an effective filing date of February 6, 2003. The present application has an effective filing date of at least December 10, 1996 as the present application is a divisional of U.S. Patent Application No. 10/354,336, filed January 29, 2003, which is a divisional of U.S. Patent Application No. 09/648,341, filed August 25, 2000, which is a continuation of U.S. Patent Application No. 09/165,513, filed October 2, 1998, which is a divisional of U.S. Patent Application No. 08/761,336, filed December 10, 1996. All disclosure in the present application is directly supported in all of these priority cases, and Applicants believe that the presently pending claims are fully supported under 35 U.S.C. § 112 in all of these cases and thus entitles an effective filing date of December 10, 1996, or earlier. Hence, U.S. Patent Nos. 6,827,977; 6,663,753; 6,764,579; 6,416,816 and U.S. Patent Application No. 10/359,298 are not available as prior art, under M.P.E.P. § 706.02, to the present application and as such these rejections should be removed.

Rejections Under 35 U.S.C. § 102

Claims 3 and 6 have been rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Rabalais et al. Claims 3-6 have been rejected 35 U.S.C. § 102(e) as allegedly being allegedly anticipated by Baldwin et al. Such rejections are traversed in part and overcome in part as follows.

Independent claim 3 has been amended to more clearly define the present invention and to expedite prosecution of the present case. Independent claim 3 now recites a method for depositing a coating comprising a continuous tetrahedral amorphous carbon on a

substrate. The method comprises ionizing a source material so as to form a plasma containing ions which comprise carbon and energizing the ions. In particular, the ions form a stream having a substantially uniform impact energy and uniform weight from the plasma straight toward the substrate so that carbon from the ions is deposited on the substrate and which promotes formation of more than 15% sp<sup>3</sup> carbon-carbon bonds. Support for these amendments can be found throughout the originally filed disclosure, for example with reference to paragraphs 15, 16, and 21. Such a method is nowhere to be found in the Rabalais et al. and Baldwin et al. references.

As the Examiner certainly knows and appreciates, a single cited art reference must teach each and every element of the claim to establish anticipation under 35 U.S.C. §102. M.P.E.P. §2131; *In re Royka*, 180 U.S.P.Q. 580 (CCPA 1974) ("All words in a claim must be considered in judging the patentability of that claim against the prior art."). The Court of Appeals for the Federal Circuit has held that, "the identical invention must be shown in as complete detail as is contained in the .... claim." *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).

With regard to the Rabalais et al. patent, Applicants note that this deposition process of diamond films requires a mass selection apparatus in which the ions pass through a 60 degree angle so that only a desired species is transmitted. See col. 12, lines 25-26; col. 14, lines 12-29. Hence, the deflected stream of the Rabalais et al. method (required by that device to select desired ion species from a wide variety of particles) is directly contrary to the straight plasma stream now recited by independent claim 3. Applicants further note that claim 3 also requires an energized stream of carbon ions having a substantially uniform impact energy and uniform weight which promotes, at least in part, formation of more than 15% sp<sup>3</sup> carbon-carbon bonds. Such uniformity characteristics, much less formation of more than 15% sp<sup>3</sup> carbon-carbon bonds, have not been shown or suggested in the Rabalais et al. patent.

With regard to Baldwin et al., this patent describes a process for depositing amorphous carbon hydrogenated films on a surface, mostly semiconductor applications, using an end-Hall ion source. Baldwin fails to show or suggest energizing ions to form a stream having a substantially uniform impact energy and uniform weight, much less promoting formation of

more than 15%  $sp^3$  carbon-carbon bonds. The present application describes deposition conditions in which the stream of carbon ions will be primarily composed of ions having a uniform weight and an impact energy which is substantially uniform. This uniformity may be promoted through the filtering of the ion stream via a filtered cathodic arc, as shown in Figure 5, or an extraction grid, as shown in Figure 3A. Thus, the present application's deposition process of ionic filtering creates an ion stream having uniform constituents to the substrate. In contrast, the Baldwin et al. process does not teach or even suggest ionic filtering. In fact, a closer examination of this reference reveals the presence of non-uniform deposition constituents in its film. Specifically, the Baldwin et al. patent states on col. 6, lines 31-47 that,

It has been observed that the thickness of a-C:H [amorphous carbon hydrogenated] film built up on the substrate is approximately a factor of two greater than can be accounted for by the ion current to the substrate alone .... it is believed that the carbon being deposited over and above the carbon from the ion flux comes [from activated species]. Such activated species may be atoms or molecular fragments (-CH<sub>x</sub> radicals) or from neutral, activated hydrocarbon gaseous species from the end-Hall ion source.

Hence, one half of the film deposited in the Baldwin et al. process contains non-uniform constituents, i.e. non-ionic species. It should also be noted such non uniform deposition systems may also give rise to pinholes which in turn prevents the films of Baldwin et al. from being continuous as compared to the uniform deposition systems of the present application which promote the formation of continuous films.

Hence, for the several reasons discussed above, the removal of all § 102 rejections is respectfully requested.

#### Rejections Under 35 U.S.C. § 103

Claims 3 and 5-6 have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Patent No. 4,486,286 issued to Lewin et al., optionally considering Baldwin et al. or Rabalais et al. Claims 7-11 have been rejected have been rejected under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Patent No. 5,556,501 issued to Collins et al. Such rejections are traversed in part and overcome in part as follows.

For the several reasons discussed above with respect to the Baldwin et al. and Rabalais et al. references, Lewin et al. similarly fails to describe or suggest depositing a coating over a substrate which is defined by energizing the ions to form a stream having a substantially uniform impact energy and uniform weight from the plasma straight toward the substrate so that carbon from the ions is deposited on the substrate and which promotes formation of more than 15% sp<sup>3</sup> carbon-carbon bonds. Applicants request, if the present rejection is maintained, that the Examiner show or explain where the cited references, alone or in combination, teach or suggest such deposition methods. Absent such a showing, Applicants respectfully request withdrawal of this 35 U.S.C. § 103 rejection and allowance of independent claim 3 (and claims which depend therefrom).

Independent claim 7 has also been amended to more clearly claim the present invention and to distinguish from the Collins et al. patent. Claim 7 now recites a method for enhancing formation of an ion beam that provides carbon deposition over a substrate. The ion beam is produced by inductively ionizing an acetylene plasma within a plasma volume and capacitatively coupling the plasma so as to form a stream of ions from within the plasma volume. The method comprises moving a magnetic field through the plasma volume to promote even resonant inductive ionization and homogenize the ion beam which deposits carbon over the substrate, wherein the magnetic field rotates with a frequency of less than 10,000 Hz. Support for these amendments can be found throughout the originally filed disclosure, for example with reference to paragraphs 62, 63, 80, and 82.

As the Examiner certainly knows and appreciates, obviousness requires the prior art teach or suggest every limitation. M.P.E.P. §2143.03; *In re Royka*3, 180 U.S.P.Q. 580 (CCPA 1974). In regard to the Collins et al. patent, a known resonant inductive ionization process with a fixed magnetic field is described for etching metals, dielectrics, and semiconductors. This references fails to teach suggest the several new limitations of method claim 7. Applicants request again, if the present rejection is maintained, that the Examiner show or explain where the Collins et al. references, teaches or suggests inductive ionization of acetylene plasma, wherein a magnetic field is moved through the plasma volume to promote even resonant inductive ionization and homogenize the ion beam which deposits carbon over the

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substrate, wherein the magnetic field rotates with a frequency of less than 10,000 Hz. Absent such a showing, Applicants respectfully request withdrawal of this 35 U.S.C. § 103 rejection and allowance of independent claim 7 (and claims which depend therefrom).

### CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,



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